
International Climate Change Cooperation and Sustainable Economic Growth

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1.0 Setting the Context

1. The passage of time brings us ever more agreement on, and understanding of, the challenges posed by global climate change. The heads of the G8 governments, meeting in July 2005, called it a “serious and long-term challenge that has the potential to affect every part of the globe.”¹ In the most definitive statement yet delivered by global business leaders, a group meeting in advance of the G8 argued that “climate change poses one of the most significant challenges of the 21st century.”²
2. The need for action is clear. A changing climate will disrupt complex environmental, social and economic systems that have built up over centuries, and which can’t withstand rapid fundamental change. The IPCC’s Third Assessment Report in 2001 warned that global warming even at existing levels had already impacted a number of important physical and biological systems.³ And it predicted significant further impacts, including:
 - Increased risk of flooding for tens of millions of coastal dwellers world wide;
 - Increased incidence of extreme weather events;
 - Reduced yields of the world’s food crops; and
 - Decreased water availability in many water-scarce regions.
3. The International Scientific Steering Committee, meeting four years later in Exeter, found that the evidence of threats had solidified.⁴ It also explored the temperature thresholds that could trigger irreversible catastrophic events such as the melting of the Greenland icecap and the shutdown of the Atlantic thermohaline circulation that warms the North Atlantic countries. They cautioned that temperature rise above 3 C would likely have “serious risk of large scale, irreversible system disruption.” At that level, climate change clearly becomes a global security issue.
4. At the same time, the speed and scale of the socio-economic transformation required to avoid the risk of serious harm is unprecedented in human history. Not willing to accept the risks inherent in a 3 C temperature rise, many have called for holding increases to 2 C.⁵ But such a limit likely means limiting atmospheric CO₂ concentrations to less than 550 ppmv—even then, the chances of achieving the 2 C goal are estimated to be *one in sixteen*⁶—which would require reducing emissions by 22 billion tonnes of CO₂ per year as compared to the baseline case by 2050.⁷ To put this into real-world perspective, achieving those kinds of cuts would require an effort that displaced 2 billion conventional cars for hydrogen vehicles, sequestered carbon from 1,400 1-GW coal-fired power plants, and increased the world’s current nuclear capacity by a factor of 10.⁸
5. As challenging a prospect as this might seem, if we fail to achieve these kinds of changes in the next 20 years, we will have foreclosed our options by entering a world we cannot leave by any effort—one at serious risk of major systemic changes. Of course, the longer action is delayed, the tougher will be the economic challenge.

¹ G8 (2005), hereinafter *The Gleneagles Agreement*.

² WEF G8 Climate Change Roundtable (2005).

³ IPCC (2001).

⁴ International Scientific Steering Committee (2005), hereinafter *The Exeter Report*.

⁵ See European Commission (2005), International Climate Change Taskforce (2005), Climate Action Network (2002).

⁶ European Commission (2005). The EC figures are based on a CO₂ *equivalent* concentration of 650 ppmv, which is roughly equal to a CO₂ concentration of 550 ppmv. They further note that a CO₂ equivalent concentration of 550 ppmv improves the chances of reaching the 2 C goal to one in six. These estimates also fall within the range estimated by Baer and Athanasiou (2005).

⁷ WBCSD (2004), based on scenarios from IPCC (2001).

⁸ Adapted from estimates presented by ExxonMobil to a CEPS Task Force, cited in CEPS (2005):8.

Evidence presented to the Exeter meeting suggests that even a 5-year waiting period would be significant. A 20-year waiting period would mean that emission reductions would need to be 3 to 7 times greater to meet the same temperature target.⁹ As such, while long-term solutions such as new technologies are fundamental to achieving the deep emissions reductions needed in the future, we will also need to focus on effective action in the short term.

6. Neither track will be easy; in the coming decades the world expects to see substantial economic development including, by 2030, some \$16 trillion investment in energy infrastructure.¹⁰ Much of this will be in developing countries as they develop with a view to enjoying the standard of living of today's industrialized countries. A critical element of the "next 20 years" climate challenge is therefore how to ensure these investments in long-lived capital stock use the best 'climate friendly' technology that is available and practicable, given national circumstances. This concern holds true for industrialized countries as well as developing countries.
7. The challenge can be framed more broadly as a pursuit of the kind of deep cuts necessary to avoid serious harm, without compromising our pursuit of development and economic prosperity. Fortunately, many elements of the necessary transformation can be achieved in ways that contribute to broad development goals as well, for example by providing clean energy to the poor, by improving local environmental quality, by fostering a new generation of beneficial technologies.¹¹ And many others are good investments in the sense that they avoid the high social and economic costs of inaction.¹² Approached in this way, the challenge becomes less a narrow and costly pursuit of environmental protection, and more a broad effort to reorient our societies and economies toward a sustainable development path.
8. This is a challenge that will require international cooperation on a scale with few precedents, on which we must bring to bear the best tools our scientific and policy communities can deliver. This paper sketches out some of the characteristics of an international policy framework that can lead us down this path. It focuses on those options that are set within, or are complementary to, the UN system.¹³ Our decisions carry much weight. The choices we make today cast huge shadows into the future, defining the ambition we can reasonably hold for prosperity and stability in the years to come.

2.0 Approaches to a Successful Regime

9. What are the critical design features in a post-2012 regime that achieves deep emissions reductions while fostering growth and development? The list assembled below is intended to serve as a platform for discussion on this question.
10. **Broad participation:** Other things being equal, the broader the participation of countries in any international climate change regime, the stronger the regime, even if the roles of different countries differ according to national circumstances (see below). The final impacts of broad participation, however, depend heavily on the depth of the commitments, particularly from key emitting countries. The ideal climate change solution would be to both broaden and deepen commitments but the politics of reaching that result are currently difficult. As such, the value of broadening must be balanced against the difficulty of negotiating a strong agreement that will find broad consensus, and in the end there may be effective approaches that involve smaller groups of countries.

⁹ *The Exeter Report*.

¹⁰ IEA (2003).

¹¹ Venema and Cissé (2004); Kuzma and Dobrovolny (2005).

¹² For cost estimates in just one sector, see Association of British Insurers (2005).

¹³ The Gleneagles Agreement acknowledged that "the UNFCCC is the appropriate forum for negotiating future action on climate change."

11. **Consideration of National Circumstances:** Broad participation does not imply a one-size-fits-all approach, and would need to respect the established principle of *common but differentiated responsibilities*. Different states will have different capacities for action and different vulnerabilities to competitiveness impacts. As discussed below, commitments can be of various types, from binding emission reduction targets to policy-based obligations. There are a number of possible bases for differentiation of target-type commitments, including per-capita emissions, total emissions, population, per-capita income, human development (as measured by the HDI, for example), institutional affiliation (e.g., membership in the OECD, receipt of ODA funds, etc.), regulatory capacity (as measured by the World Bank's governance index, for example).¹⁴ Any viable system would have to take into account a number of these criteria, and would, moreover, have to be subject to requests for special considerations.¹⁵ The types of national engagement that might be appropriate in a differentiated post-2012 regime (surveyed in the following section) would need to be contingent on the foundation of Annex B countries' demonstrated success in meeting their current Kyoto commitments.
12. **Environmental Effectiveness:** A key guiding criterion for any post-2012 international regime on climate change is the extent to which it contributes to the basic objective of the UNFCCC, by stabilizing greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Some states have defined this threshold in concrete terms, as a specific target for average temperature rise, or as a maximum atmospheric concentration of CO₂ equivalent. At the end of the day any effective approach will boil down to a focus on global emissions of GHGs in specific crucial time periods.
13. **Cost Effectiveness:** This principle would have us seek to achieve the necessary environmental result at the least cost, with a minimum degree of economic disruption. This applies at the aggregate international level, and also at the level of countries, regions and firms, where there may be uneven burdens of cost, and shifts in competitiveness. As noted below, the use of market mechanisms, where appropriate, can contribute powerfully to achieving cost-effectiveness. In the longer term, development of new technologies will be crucial to reducing costs of mitigation. And any framework should take account of existing capital stock and life cycles, and should offer predictability of investment conditions to the extent possible.
14. A multi-gas approach will be far more cost-effective than one that covers a more limited set of GHGs.¹⁶ Similarly, an approach covering a broad variety of types of emissions will be preferable. Any regime that did not effectively cover LULUCF-related emissions, for example—which account for some 25% of global totals—would be sacrificing cost effectiveness. The benefits of breadth of coverage obviously need to be weighed in each case against the difficulties that might be anticipated in the course of negotiating and implementing that coverage.
15. **Flexibility:** A successful post-2012 regime will ideally be flexible in at least two distinct ways. First, it should be open to revision in light of new scientific knowledge and/or changes in political will for action (while respecting the need of private investors for predictability). In fact, it should have mechanisms for proactive continuous improvement. Second, it should be flexible enough to seamlessly incorporate actions taken at various levels, from sub-national efforts to industry-led efforts to the efforts of sub-sets of UNFCCC Parties in the pursuit of the Convention's objectives, such that the "orchestra" of efforts achieves some harmony.
16. **Simplicity:** Other things being equal, the simpler the regime the more likely it is to be successful in pursuing its objectives. This principle is particularly relevant in areas such as measurement and reporting.

¹⁴ For a discussion of the types of criteria for differentiation, see Torvanger et al. (2005).

¹⁵ Most iterations result in some obviously inappropriate country classifications, for which negotiated exceptions should be possible.

¹⁶ Mann and Richels (2000), MIT (2000).

17. **Complementarity:** A successful regime of actions will involve strengthening the linkages between mitigation efforts and the achievement of such related goals as poverty alleviation, energy security, protecting human health, reducing pollution and maintaining biodiversity.¹⁷ In the final event these linkages are inescapable; weak action on climate change will undercut progress on development goals such as the Millennium Development Goals, as the poor and marginalized bear a disproportionate share of impacts,¹⁸ and will mean major environmental disruption. And many of the sorts of needed changes—such as providing clean energy to the poor—are fundamental to achieving broad development and environment goals. A deliberately integrated approach will be most effective at exploiting these kinds of synergies, and will also be more robust over time in the face of competing policy objectives.
18. **Long-Term Framework:** While it will probably be impossible to prescribe many actions and policies in the long-term, any international regime should be long-term in character. While it is specific about short-term obligations, it should also create the framework within which countries can agree to pursue climate change objectives over time.
19. **Political Acceptability:** At the end of the day, negotiators must take the results of their work back to their respective domestic audiences, where it will face the critical test of political acceptability. In part this is a function of how well the other principles enunciated above have been followed; for example, an environmentally ineffective agreement will likely be strongly rejected, as will one that is unnecessarily costly. Similarly, an agreement that lacks complementarity risks foundering on the rocks of competition with other political priorities. The fundamental importance of this test highlights the need for effective tools of communication, discussed below.

3.0 Elements of a Successful Regime

20. What are the most viable options to consider in a post-2012 international approach to climate change, given the key elements described above? This section considers three themes of central interest: how to simultaneously pursue mitigation and economic prosperity; how to time those efforts; and how to improve information and communications related to climate change.

3.1 Climate Change Mitigation and Economic Prosperity

21. A central challenge in thinking about climate change actions post-2012, as outlined in this paper's opening section, is to elaborate a regime of actions at the international and national levels that simultaneously pursues climate change mitigation and economic prosperity. It is a challenge that is relevant in countries at all levels of development, and one that is underlain by the fundamental connections—perhaps more obvious in the sphere of climate change than anywhere—between economic progress and environmental integrity.
22. In an assessment of 44 proposed policy options (drawing on Bodansky (2004)), Bell *et al.* (2005) find that all can be categorized as belonging to one of five different general policy approaches:
 - *Extension of Kyoto Approach* –the existing framework would be continued, deepening the absolute reductions required from developed countries, while gradually providing incentives for commitments from major emitting developing countries (linked, in some fashion, to their level of development).

¹⁷ The Gleneagles Agreement commits the G8 countries to act with “resolve and urgency” to meet these sorts of “shared and multiple objectives.”

¹⁸ Working Group on Climate Change and Development (2004).

- *Parallel Climate Policy Approach* –climate change would be addressed through either regional or sector-based approaches coordinated through a process parallel or complementary to the UNFCCC.
- *Country or Region-Specific Approach* –each country/region would develop a plan that suited its circumstances and priorities, and then would participate in trade-like negotiations to achieve agreement on equivalent or equitable efforts for each country.
- *Integrated Policy Approach* – the regime would focus on integrating climate change considerations into the development of the ‘mainstream’ priorities of countries—particularly in areas related to energy planning, natural resources management and urban planning.

23. These approaches, like most of the options discussed below, are not mutually exclusive; in fact the discussion below reveals that few will by themselves adequately deliver the elements of a successful regime described in the previous section. Rather, they will more suitably be employed as elements in a larger constellation of coordinated efforts. Similarly, there are a number of possible complementary initiatives not discussed here that could make these options more feasible, effective. For example, mitigation, adaptation and technology development and deployment efforts might be greatly boosted by dedicated funds administered outside the framework of the regime.
24. **Quantitative commitments:** One of the most fundamental questions to address is whether some countries will adopt quantitative commitments. These could take any of a number of forms, but three of the most commonly discussed are absolute (fixed) national emissions targets (as in the current regime), dynamic intensity targets (e.g., expressed as a ratio of emissions to GDP) and per-capita emissions targets.¹⁹ Any of the three could be set with some final objective in mind, such as atmospheric concentration levels of CO₂ equivalent, or maximum temperature increase. Fixed emissions targets offer the benefit of more direct linkage to any final objective, but are inflexible in the face of potentially high costs of action (a particular concern in the context of economic growth).²⁰ Dynamic intensity targets, conversely, are more sensitive to cost factors, but have weak linkages to any final objective expressed in terms of atmospheric concentration or warming (which could easily worsen in the context of economic growth).²¹ Moreover, uncertainties in and potentially wide fluctuations in GDP, and disconnections between these and greenhouse gas emissions, can make this form of target unworkable in practice.²² This is especially a concern for developing countries. Per-capita targets are fundamentally more appealing on equity grounds, and allow greater space for economic growth in developing countries. However, they fail to effectively address the principle of differentiated national circumstances. They would, for example, place inappropriately heavy burdens on those countries that rely heavily on fossil fuel exports for their economic well-being.
25. A number of variations can be appended to these basic options. The commitments could be binding or non-binding. Safety valves in the form of capped prices for emission allowances could help address the problem of price uncertainty of fixed emissions targets, and trading systems for emissions and credits (such as the existing CDM, JI, IET) could provide cost effectiveness. It has also been suggested that targets could be expressed as a quantity of emissions reductions (expressed as a negotiated percentage of actual emissions during the compliance period), yielding a more flexible approach in the face of uncertainty about GDP

¹⁹ For a discussion of intensity targets, see Philibert *et al.* (2003); Tol (2005). For a discussion on the need for per-capita targets, see Agarwal and Narain (1991).

²⁰ Philibert *et al.* (2003).

²¹ Blanchard and Perkaus (2004); Müller, Michaelowa and Vrolijk (2002); Dudek and Golub (2003).

²² For example, if GDP stagnates without commensurate emission reductions, emission intensities (in the form of emissions/GDP) will rise and may exceed a target at the same time as economic conditions in the country worsen and innovation and investment (presumably) slow down. Pizer (2005); Dudek and Golub (2003).

growth.²³ Either emissions or intensity targets could be part of a hybrid approach that had differentiated approaches to commitments; this sort of approach would work to address differences in national circumstances.²⁴ And any of the three types of targets could be expressed as short-term or long-term commitments.

26. **Market mechanisms:**²⁵ Market-based mechanisms will be a key part of any approach to ensuring economic prosperity while achieving necessarily deep cuts in emissions. Both the G8 political leaders and leaders from industry recently affirmed their strong support for using market-based policies to address climate change.²⁶ The main advantage of such policies is that they allow for environmental goals to be achieved at the lowest cost, by providing flexibility in how reductions can best be achieved.²⁷ They also can provide an international framework to help mobilize finance for clean technologies in major infrastructure investments. The challenge in adopting such approaches will be to design regimes to which they are amenable. Fixed targets are easily amenable to a market-based approach, as are certain types of sectoral approaches. The most commonly proposed formulations of other approaches don't as easily lend themselves to market mechanisms.²⁸
27. Apart from the economic efficiency arguments for market-based approaches, there is also an argument for a regime that offers some continuity with the Kyoto mechanisms, in which a host of private investors have invested heavily. On the other hand, there will be reluctance in many countries to make heavy use of mechanisms that are seen as simple transfer payments with few tangible environmental results. If such an outcome were to be agreed, there would likely be a need to "green" those mechanisms—in particular international emissions trading—to help them meet the test of political acceptability.²⁹
28. There's a range of market-based policies available for addressing climate change, but a specific emphasis has been given to mechanisms that create an international carbon market. For this to exist, some sub-set of states will have to take on some sort of binding quantitative commitments. That is, to have market mechanisms that use a carbon market, we will need a policy framework that somehow gives value to carbon in the way the Kyoto targets do.
29. **Technology agreements:**³⁰ As an alternative to, or complement to, quantitative commitments, countries could pursue technology agreements.³¹ Such an approach could be pursued by groups of countries—perhaps relying on those few that would cover a large share of global use of a given technology. The agreements would spell out coordinated international approaches to funding research & development, support for market development (such as subsidies, assured market shares), regulatory reform to facilitate uptake, and demonstration projects in sectors that have high potential for low-cost high-impact solutions. Candidate sectors include hydrogen, fuel cells, nuclear fusion, large-scale solar-based generation, biomass fuels and carbon sequestration. Another approach to technology agreements would see countries commit to technology-related sectoral targets (e.g., zero emission power generation by a certain date), and then cooperate toward such goals in the ways described above. A drawback of the technology approach is its

²³ Baumert and Goldberg (*forthcoming*).

²⁴ This point is made in paper 3. For a survey of possible permutations, see Bodansky (2004). Bell *et al.* (2005) assess the various options on the basis of a number of criteria.

²⁵ Paper 3 goes into much greater depth on the nature of market-based approaches to climate change mitigation.

²⁶ G8 (2005), WEF G8 Climate Change Roundtable (2005).

²⁷ For a synthesis of the literature on this question, see IPCC, (2001b): Sections 7.3, 8.3, 9.2 & 10.2.

²⁸ In the end, any approach that sets binding quantitative targets of some sort can be amenable to market approaches.

²⁹ See Moe, Tangen *et al.* (2001); World Bank (2004).

³⁰ Paper 2 goes into much greater depth on the options for a technology approach to climate change mitigation.

³¹ The recently-announced Asia-Pacific Partnership in Clean Development and Climate is one example of this sort of approach.

inability to deliver predictable emissions reductions. As such it is—like many of the options surveyed here—most appropriate as part of a broader mix of approaches.

30. A focus on developing new technologies, by harnessing the transformative power of innovation, offers the potential for emissions reduction on a grand scale. But it is for the most part a long-term approach. Such a far-sighted vision is needed; as challenging as the cuts in the next 20 years will be, there will be a need for an even more ambitious effort thereafter. A number of countries have called for emissions cuts by 2050 of 60 – 80%. This underscores the urgent need for a focus on the next generation of carbon-free technologies—on the necessary research, development, demonstration, deployment and diffusion—as a complement to short-term efforts to achieve reductions.³² These sorts of investments, undertaken now and bearing fruit in the longer term, will avoid massive costs down the road in achieving deep emissions reductions while using old-generation or marginally improved technology. Complementary short-term efforts such as quantitative commitments and market mechanisms both add to the incentives for technology development and, by altering the current emissions scenario, alleviate the immense pressure on future technologies to deliver cuts.
31. **Sectoral approaches:** Most permutations of technology agreements involve a sectoral approach. Another type of sectoral approach would be to set absolute (emission-based) or relative (intensity-based) targets by sector for the major sectors of concern. The former could involve reduced emissions, or even a long-range zero-emissions commitment in a given sector. The latter could be based on intensity of production (GHGs per MW of electricity produced), or on a performance standard (GHG produced per kilometre by automobiles). The targets could be differentiated according to national circumstance, either according to the state of the sector, or according to non-sector-related criteria such as level of development, per-capita emissions, etc. Another form of sectoral approach would be policy-based, with pledges by countries to adopt and implement specified policies in the sectors covered. Under any sectoral approach the regime would have to be tailored somewhat differently for each sector, according to its specific circumstances (levels of trade, state of technology vs. state of equipment, levels of emissions, etc.).³³ Sectoral approaches could conceivably be amenable to a crediting/trading mechanism that rewarded those countries that bettered their targets—a key feature not shared by most formulations of technology and policy-based approaches.³⁴
32. Unlike technology approaches, some sectoral approaches have the advantage of being able to deliver a more or less predictable environmental outcome. It is not too difficult, for example, to estimate the impacts of a zero-emissions scenario in the electricity sector, or of improved fuel efficiency in the automotive sector. On the other hand, because they may limit overall coverage and thereby miss opportunities for cost effective actions, sectoral approaches could be more costly if not complemented by other approaches.
33. Sectoral approaches might also be implemented globally, by industry associations as opposed to governments, or by governments negotiating with a sector at the international level. One difficulty here would be in coordinating action and ensuring compliance in those sectors where there are many dispersed actors. Another would be determining how government and industry actions would relate to the multilateral regime established under the UNFCCC; how would global commitments by industry be reconciled with national commitments by governments?
34. A key issue is how many sectors to cover under such an approach. It would obviously be simpler to negotiate only a few key sectors with the right characteristics (such as few key players, a comprehensive industry association, or available clean technologies). On the other hand, such an approach could give rise to undesirable competitiveness impacts between covered and non-covered competing sectors, and between

³² Sanden and Azar (2005).

³³ Bosi and Ellis (2005).

³⁴ Crediting/trading for sectoral efforts, however, faces some significant methodological and data-related obstacles. See *Ibid.*

countries in whose economies the covered sectors feature more or less strongly. From this perspective, a larger number of covered sectors would be better.

35. Conversely, a sectoral approach might yield fewer competitive concerns than an economy-wide target approach under which a national governments are free to allocate the responsibilities for emissions reduction across sectors. Such approaches can give rise to governments shielding particular sectors, and thereby granting them advantages over their competitors in other countries that do not follow suit.³⁵
36. For developing countries, a sectoral approach involving dynamic crediting baselines can allow countries to focus on their key sectors—for example, those where inward investment is needed—that serves the dual purpose of sustainable development and emission reductions.
37. **Policies and measures:** A “bottom-up” approach, this would involve pledges by national governments to implement certain types of GHG-reducing policies and measures. Ideally these would be part of broader commitments to development goals that would yield both climate-related and other benefits. For example, governments might commit to an improved transportation infrastructure, including in the plan such GHG-reducing elements as public transportation, fuel efficiency, technology standards and so on. The co-benefits would include improved air quality, improved transportation services, a more attractive investment climate, and others. The result would be a mainstreaming of climate-related objectives in national development policies in areas such as energy, agriculture, manufacturing and transportation.
38. From a cost-effectiveness perspective, this kind of mainstreaming is desirable as it achieves synergies that reduce the overall costs of achieving the chosen objectives. It also fits well with the pursuit of a broad sustainable development approach to addressing climate change.
39. There are several permutations of this approach. One would apply only to developing countries, constituting all or part of their involvement in a broader regime. Multilateral sources of funding might support their policy efforts. In another variation, a crediting mechanism might accord credit for the GHG reductions made by policies and measures that were deemed “additional”—those that went beyond what would be considered regulatory business as usual. Both such approaches have the advantage of helping developing countries substantively engage in the regime with low impacts on their pursuit of economic prosperity. Neither approach on its own, however, can guarantee a desired environmental outcome.
40. Apart from the notion of a separate “policies and measures approach,” it is obvious that policies and measures will play an integral part in all approaches. For example, an international carbon market requires enabling domestic policies to link actions by a country’s private sector to the market. Or, in the instance of a country taking on a crediting baseline for a sector, domestic policies and measures would be the means to ensure the overall sector beats the baseline so that individual investments are able to get credits.
41. **Selected assistance:** It will be particularly difficult in some countries to ensure economic prosperity in the face of international and domestic action to combat climate change. Such actions, if they are successful, will result in some degree of creative economic destruction, posing special challenges for economies that rely heavily on declining sectors, or in general whose terms of trade might deteriorate. Oil-exporting developing countries and least-developed countries that fit this mould may need targeted assistance to help diversify or restructure their economies. The advantage to a regime that involves such an approach, aside from its desirable economic outcome in the target states, is its greater political feasibility. Difficulties include establishing the criteria for and nature of assistance.
42. **Adaptation:** Even if the global community succeeds in the sort of ambitious action contemplated above, there will still be adverse effects from the current and future levels of greenhouse gas concentrations in the

³⁵ Cosbey (2005); Bodansky, Diringer and Wang (2005).

atmosphere.³⁶ Some of the most severe impacts are predicted to fall on those countries least able to cope, and with the lowest GHG emissions. In all countries the marginalized are likely to be more vulnerable and disproportionately affected. In the end, however, we will all bear the costs of a changing climate; estimates of just insurance-related damages in OECD countries from unchecked climate change are in the hundreds of billions of dollars annually.³⁷ Any international policy framework must consider how to approach the task of adapting societies, economies and infrastructure—particularly but not exclusively in least developed countries—to reduce vulnerability and lessen any adverse impacts.

3.2. Timing Considerations

43. How can timelines for setting climate goals be adapted to the competing demands of rapid emission reduction and the longer timelines that can underpin economic and investment planning? Determining an appropriate policy response is inherently challenging. The basic problem is that while climate change and its related impacts will unfold over several decades, stretching into centuries, it requires a policy response that is to a large degree guided by current political realities. The fact of cumulative emissions (CO₂, for example, remains in the atmosphere for approximately 100 years after it has been emitted) means that nations must respond today to this very real and ever-growing threat. The challenge is not to find the best policy today for the next 100 years, but rather to select near-term and long-term strategies that do not compromise future options, are economically and socially manageable in current circumstances, and can be adjusted over time in light of new information.
44. That challenge is intimately related to cost considerations. The basic tension is that early action is inherently costly since it may force an early turnover of capital stock—a particular concern in sectors where investments are long-lived and costly.³⁸ As well, later action can take advantage of superior, lower-cost, technologies not available to today's investors. On the other hand, early action may help to induce technological change through the price signals it sends and any incentives it involves, bringing new cost-saving technologies on board more quickly.³⁹ As well, early action provides a hedge against uncertainty; if countries decide in several years that they need even more demanding targets, a decision today to take later action would mean much greater costs incurred than under an early action scenario.⁴⁰ Finally, a decision to take later action assumes that the future generations onto which we “backload” the responsibility for deep cuts will actually be willing and able to make them.
45. Several guiding rules can help in coming to grips with timing considerations. First, any of the approaches described above should take explicit account of the economic realities in the affected sectors. Sectoral approaches, for example, might be tailored by sector to account for the age and expected lifetime of the existing and planned capital stock. As well, given the major investment expected in the next 25 years in the energy sector in developing countries, it may be desirable to elaborate mechanisms that facilitate adoption of best available technology in those countries. Otherwise, the up-front premium necessary for such investments may deter investors (even where there is an attractive payback time, if capital is scarce), and we will be locked into many decades of excess emissions from trillions of dollars worth of energy infrastructure.
46. Second, it was argued above that there is an urgent need for complementary actions aimed at both near-term and long-term results. A technology approach might be ideal as a longer-term strategy for addressing the need for deep cuts in emissions, but would need to be coupled with parallel strategies such as targets that will have impacts in the short-term.

³⁶ Yamin, Smith and Burton (2005).

³⁷ Association of British Insurers (2005).

³⁸ Transport and energy infrastructure score highly on both categories.

³⁹ Goulder (2004).

⁴⁰ SEPA (2002), Ch. 3.

47. Third, a framework involving the flexibilities of emissions trading and allowance banking provides timing alternatives that help to reduce costs that might otherwise occur if actions are forced—in location and time.
48. Finally, the most important element in any regime from an investment planning perspective is predictability. To return to a particularly salient example, given that many energy infrastructure investments have lifetimes that span decades, the massive significance of the energy sector to climate change efforts, and the \$16 trillion of investment needed over the next three decades in that sector,⁴¹ it is critically important to send signals now about the type of regulatory and cost impacts any future climate regime will have. Clearly it is impossible to spell out the details of agreements that have yet to be negotiated, but to the extent it is possible to send signals, the result would be a better mesh of the short-term nature of negotiations with the long-term nature of investment planning. From this perspective, a regime that had no defined ending date would be preferable. To preserve flexibility, however, such a regime would need to incorporate mechanisms for amendment and continual improvement.

3.3. Information and Communication

49. How might we better assess, communicate and take into account the economic and social risks of a changing climate, the cost to sustainable growth of not taking aggressive action, and the many non-climate-related environment and development benefits to be achieved by appropriate action?
50. Better assessment calls for either increased funding to the pursuit of climate-related science, or more efficient use of existing funding (or both). Better communication is a challenge at two levels: communicating to policy makers, and communicating to the public at large.
51. Public awareness of climate change as an issue is key to enabling effective political action. The challenge is to reach a broad audience cost-effectively with a complex message. Useful lessons might be drawn in this regard from the expertise of the advertising industry world wide, which has the benefit of years of experience honing its skills in communicating to mass audiences and changing consumer behaviour. International coordination of efforts would undoubtedly be productive.
52. Youth represent a key audience for this kind of education, being at once willing to learn, eager to make a difference, and able to influence family members that would be more difficult and costly to reach by other methods.
53. Communicating to decision makers is a separate challenge: how can they be provided with the knowledge and tools they need to better integrate the climate change imperative into overall public policies? This kind of integration at the national and sub-national levels will help determine the ultimate success of climate change efforts, climate change being so intimately tied to objectives in broader government policy-making (e.g., priorities in energy systems, natural resource investments, transportation and urban planning objectives, national-level strategies to achieve the Millennium Development Goals.) Those states that have successfully established institutions of communication and integration might pool their experience in a survey of best practice, and funding might be made available to disseminate and act on the results.

4. Questions for Consideration

54. This paper is intended to serve as a platform for productive discussions on how to achieve necessarily deep cuts in emissions while still pursuing economic prosperity. It suggests a number of questions that will need to be considered in the process of elaborating a post-2012 regime for international action on climate change.

⁴¹ IEA (2003).

What is the ideal mix of approaches, given the need for fundamental innovation in some sectors over the next 50 years, the simultaneous need for even more short-term emission reductions and the importance of addressing the long-term emission consequences of near-term investments?

How should the international community differentiate the participation of nation states in a post-2012 regime? What mix of commitment types will be at once politically feasible, cost-effective and environmentally effective?

What are the implications of the various post-2012 options for the nature and process of the negotiations? Given that some options dictate important differences in approach, and given the lack of consensus on the options to pursue, how do we proceed?

How can we more effectively engage industry and the private sector in meeting the challenges?

How can we ensure that countries with special challenges are assisted in their struggle to adapt to a carbon-constrained global economy?

How can we give private investors the greatest possible degree of long-term certainty, predictability?

How can we better communicate, to both decision makers and the general public, the urgency of the challenges presented by climate change?

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